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Longitudinal variability of the zonal and meridional circulation and the intensity of planetary waves in the lower and middle atmosphere

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Abstract

Mesosphere/lower thermosphere wind data sets from three midlatitude sites and UKMO assimilated wind data in the height range 0-55 km at 55°N were used to show the altitudinal and longitudinal variability of mean winds and planetary waves at mid-latitudes during solstices. In spite of the existence of longitudinal differences of the prevailing winds and the annual and semiannual oscillations, certain common features of the zonal wind height profiles are visible in the height range 10-100 km. The maxima of the mean annual winds and of the intensities of the annual and semiannual oscillations occur near the stratopause. In the height range 80-100 km there is an increase in the annual mean winds and in the amplitudes of the annual and semiannual oscillations; also the semiannual oscillation is larger than the annual one. Minima of the annual/semiannual oscillation amplitudes at heights of 85-95/80-85 km are accompanied by corresponding phase changes of 180 degrees in relation to those values near the stratopause. The height structure of meridional wind parameters is more complicated, with dependences on longitude and height. Longitudinal variability in the intensity of planetary waves was also found.

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